Space Weather Forecast

Issued on Tuesday, 31 January 2023 at 12:38 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Slight Chance of G1 Minor Geomagnetic Storms at first, declining through midweek UTC.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low throughout the last 24 hours, with Common-class flare activity recorded, peaking at 31/1100UTC from a sunspot region near the southeast of the Sun. There are now five sunspots on the Earth-facing side, with changes observed generally being of slow proliferation followed by fading of constituent spots in the four relatively simple magnetic dipoles, with the one unipolar group remaining unchanged.

Satellite imagery for the period shows a large high latitude Coronal Mass Ejection (CME) heading largely above and slightly ahead of the track of the Earth in its orbit. The source is not immediately obvious, however there is a large 'filament channel'-like signature in the northwest quadrant on some extreme UV imagery late in the UTC evening and through the early hours UTC. Provisional modelling fitting for this CME indicates that any Earth incidence will most likely be marginal if present, however model results are pending.

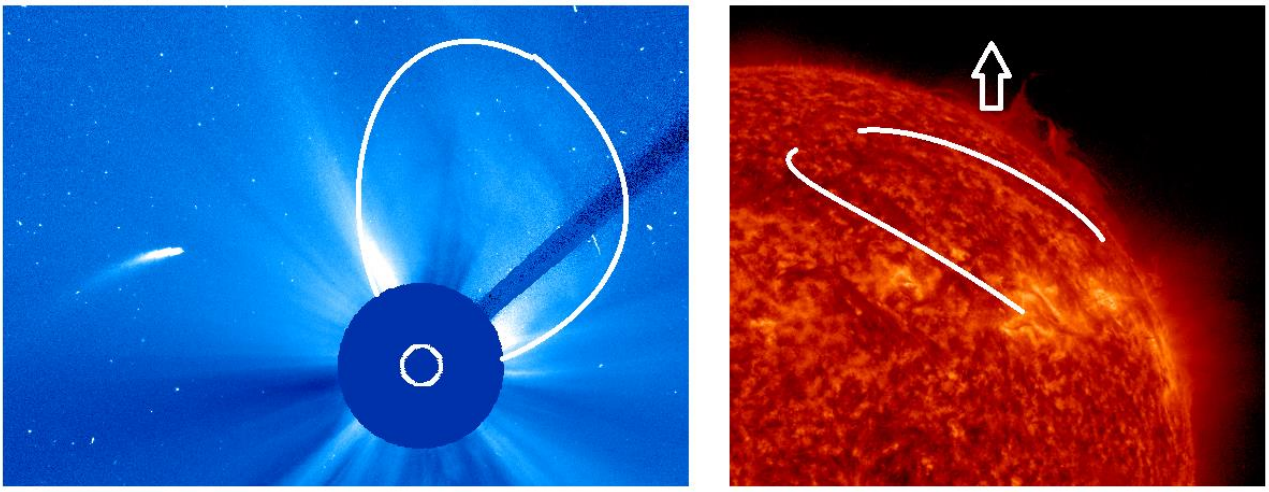

Figure 1: False-colour satellite and extreme UV imagery from 31/0100UTC, showing a tentatively identified front-sided high latitude CME (left), possibly related to the filament channel-like signature seen in some EUV imagery (right, commencing earlier but peaking in brightness around the same time). Also shown (incidentally) is comet Machholz 96P (far left).

A second, low latitude CME visible from late afternoon UTC on Monday 30 January was determined to be most likely far-sided to no effect (at Earth).

No Earth-bound CMEs therefore feature in the forecast at present, but with results for the above

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probable northwest filament pending.

Solar Wind / Geomagnetic Activity: The solar wind initially showed a slow regime, transitioning into a fast wind after 30/2000UTC from an equatorial coronal hole. This was earlier still than the forecast which was in turn brought forward based on evidence from an upstream satellite.

The solar wind speed fell initially from Slightly Elevated levels to Background for a time, before rising with the advent of the fast wind to reach a peak near Elevated by 30/2145UTC. The number of particles comprising the wind rose from Background to a Slightly Elevated peak, falling in turn as the fast wind developed. The magnetic field rose from Background to also become Slightly Elevated before moderating a little as the period ended. The north-south component varied between being co- and anti-aligned with the Earth's field in a slowly changing tendency.

The net effect of the above solar wind measures was nevertheless for quiet geomagnetic activity, with a provisional peak below even Minot Storm G1 in the 21-24UTC window, i.e. shortly after the fast wind's onset.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be predominantly low, with no significantly active regions on, or due to rotate onto, the facing side of the Sun, with a slight chance of isolated Moderate-class x-ray flares.

Solar Wind / Geomagnetic Activity: No Earth-directed CMEs are forecast in the next four days, but with one CME candidate pending modelling results.

The current high speed stream is expected to peak on day one, Tuesday 31 January, declining towards the end of the period. Geomagnetic activity should see a peak Slight Chance of G1/Minor Storm at first, this risk soon abating through midweek UTC to a largely quiet picture to end the current UTC working week.

Energetic Particles / Solar Radiation: No solar radiation storms are likely given the dearth of significant sunspots.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

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Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	10	10	10	10
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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